Structure	Outlining (A: Anatomical) (V: Volumetric) (p: p-value)	Dosimetric parameter (Range) Mean (Gy)	V70 (%)	V60 (%)	V50 (%)
Superior Pharyngeal Constrictor	A	70.1-71.0	53.8-82.1	98.8-100	All 100
	V	55.2-70.2	2.5-60.8	37.7-100	71.4-100
	p	0.005	0.005	0.005	0.012
Middle Pharyngeal Constrictor	A	69.5-71.5	54.2-90.1	97.6-100	All 100
	V	62.5-71.0	19.8-74.7	55.6-100	94.5-100
	p	0.007	0.005	0.012	0.043
Inferior Pharyngeal Constrictor	A	45.2-64.3	0-27.3	2-77.2	26.9-91.9
	V	44.4-65.8	0-33.1	0-83.3	20.8-92.8
	p	0.028	0.866	0.093	0.017
Supraglottic Larynx	A	54.6-69.7	26.7-59.9	53.1-100	57.3-100
	V	51.6-68.7	1.4-50.1	19.0-97.6	52.1-100
	p	0.005	0.005	0.007	0.012
Oral Cavity	A	41.8-56.3	0.3-10.8	7.0-44.5	22.1-66.9
	V	24.5-53.3	0-10.8	0-41.5	0.8-57.3
	p	0.012	0.093	0.012	0.012
		Volume (cm^3)			
CTV1	A	142.7-427.3			
	V	70.7-402.2			
	p	0.005			

Table 1: Mean dose Gray and partial volume doses as %

Conclusions: This planning study demonstrated that the method of outlining influences the dose to normal structures. In particular, the dose to swallowing structures was significantly higher with anatomical outlining. This variation in delineating targets for treatment should be considered when assessing the final outcomes of this study.

EP-1157

FDG-PET guided dose escalation with TomoTherapy for locally advanced oropharyngeal cancer

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Purpose/Objective: evaluating the clinical outcome of radiation dose escalation to 18FDG PET/CT positive tumor sub volumes using the Simultaneous Integrated Boost (SIB) IMRT technique by means of Helical Tomotherapy (HT), in locally advanced Oropharyngeal cancer patients.

Materials and Methods: 38 patients treated between 2005 and 2013 who underwent HT for squamocellular oropharyngeal stage III-IVB cancer were evaluated. HT was delivered with the SIB technique at different dose levels: 69Gy (2.3 Gy/day) to the PET-positive volume (GTV-PET), 66 Gy (2.2 Gy/day) to the clinical target volume for tumor and metastatic nodal stations, 54 Gy (1.8 Gy/day) to the clinical negative neck region concomitantly, in 30 fractions. Concurrent chemotherapy was given to 31 patients (cisplatin 75-100 mg/m²/21 days for 23 patients, cisplatin 30-40 mg/m²/week for 6 patients and Cetuximab for 2 patients) Metabolic indexes of primary tumour, including metabolic tumour volume (MTV), metabolic tumour volume thresholds 40%, 50%, 60% (MTV-T-40%, MTV-T-50%, MTV-T-60%) and mean standardized uptake value (SUVmeanT) were also considered.

Results: The median follow-up was 28 months (range: 3-109); all patients completed the treatment as scheduled. Temporary treatment interruption due to acute toxicity, mainly mucosae, was observed in 8 patients. The 2.5-year Overall Cancer specific (OS), Local disease-free Tumor (LTC) Local disease-free Nodal (LNC) and distant metastasis-free (DMFS) survivals were 88%, 83%, 88% and 77% respectively. Multivariate Cox regression analyses revealed that GTV-PET and GTV-T-PET are predictors for OS with a best-cut-off value equal to 30.9 cc (p=0.022) and 22.4 cc (p=0.029) respectively, while MTV-T-40%, MTV-T-60% and SUVmeanT are predictors for OS with a best-cut-off value equal to 21.3 (p<0.0001), 13.3 (p<0.0001) and 9.2 (p=0.01) respectively

Conclusions: The use of SIB-HT with dose escalation to 18FDG-PET positive tumor sub-volumes is a feasible technique even with concurrent chemotherapy. Very promising 2.5-year loco-regional disease control rate are obtained. The results of the present study suggest that GTV-PET has a predictive value for the SIB-HT outcome. These findings may constitute the basis for more personalized treatments.

EP-1158

Impact of oral cavity contouring on treatment planning in head-and-neck patients treated with IMRT techniques

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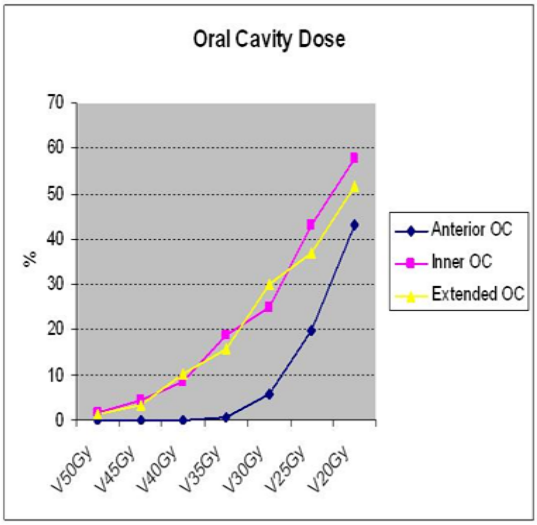
Purpose/Objective: Dose to the oral mucosa and its contribution to acute mucositis is a dose/volume/outcome relationships recommended for investigation. Higher Dmean and Dmax would be supposed to produce more severe toxicity as such as other surveys have suggested. The aim of this study is to evaluate how different oral cavity (OC) contours in head-and-neck patients influence on treatment planning and, secondary, on the expected toxicity in head-and-neck IMRT.

Materials and Methods: We analyzed the dose delivered to the oral cavity as organ at risk (OAR) designing three different contours in the same advanced head-and-neck cancer patient. Treatment was designed according to international recommendations utilising Intensity Modulated Radiotherapy (IMRT) technique with 7 fields and dynamic multileaf collimator, delivering 70 Gy to the Planning Treatment Volume (PTV). The Monaco treatment planning system with Monte Carlo algorithm was used. The Quantitative Analysis of Normal Tissue Effects in the Clinic (QUANTEC) report has not well-defined which structures should be included in the OC as organ at risk (OAR) and has not determined the constraints to apply. For this reason we defined three different contours including different structures (Tab. 1). Anterior OC included painful mucosa that can have a significant negative impact on quality of life and swallowing. Extended OC included anterior OC and other structures that inevitably are close to the PTV. Inner OC was a middle volume that includes the structures inside the gingiva. Oral cavity Dmean, Dmax, V50Gy, V45Gy, V40Gy,

V35Gy, V30Gy, V25Gy and V20Gy were recorded and compared with standard statistical analysis.

	Anterior OC	Inner OC	Extended OC
Lips	Included	Excluded	Included
Hard palate	Only mucosa	Included	Included
Floor of the mouth	Only mucosa	Included	Included
Gingiva	Included	Included	Included
Teeth	Included	Included	Included
Oral vestible	Included	Excluded	Included
Orbicular oris muscle	Included	Excluded	Included
Tongue	Ventral 2/3	Included	Included
Soft palate	Excluded	Included	Included
Corners of the mouth	Included	Excluded	Included
Dmean	18.9%	22.3%	20.9%
Dmax	37.6%	64.9%	64.9%
V50Gy	0%	1.8%	1.5%
V45Gy	0%	4.3%	3.5%
V40Gy	0%	8.5%	10.2%
V35Gy	0.7%	18.9%	15.7%
V30Gy	5.7%	24.8%	29.9%
V25Gy	19.7%	43%	37%
V20Gy	43%	57.6%	51.5%
OC Volume	88.6 cc	151.3 cc	182.2 cc

Results:



Each defined contour allowed different constraint compliance for the oral cavity and made easier or more difficult to achieve the prescribed dose to the PTV. Results obtained for anterior OC showed the lowest Dmean and Dmax in this OAR. Anterior OC does not receive more than 30-35 Gy, however inner and extended OC receive 45-50 Gy (Fig. 1). These results allowed to apply a tighter constraint, decreasing the expected mucosa oral toxicity, and to achieve the prescribed doses to the PTV. Results for extended OC forced to apply a more relaxed constraint for the OAR to achieve the prescribed dose. Inner OC showed worse results compared with extended OC due probably to the differences of volume. As conclusion, different structures included in the oral cavity as OAR (different OC contours) imply different dose constraints and outcomes.

Conclusions: It is necessary to define a consensus to unify the structures that should be included in the oral cavity as OAR in head-and-neck cancer patients treated with IMRT techniques. Differences among physicists´ criteria influence on OARs volume and furthermore, have an impact on constraint compliance for the oral cavity as OAR.

Electronic Poster: Clinical track: Lung

EP-1159

Normal tissue complication models for acute esophagitis in patients treated with accelerated radiotherapy

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Purpose/Objective: The primary dose-limiting acute toxicity in irradiation of malignant lung tumors is acute esophagitis (AE). The aim of this study is to investigate dosimetric and clinical predictors for AE grade ≥ 2 in patients treated with accelerated radiotherapy for non-small-cell lung cancer (NSCLC).

Materials and Methods: 66 patients with locally advanced NSCLC were included in the present study: 4 stage II, 44 stage IIIA and 18 stage IIIB. All patients received Platinum based induction chemotherapy followed by dose differentiated accelerated radiotherapy (DART - bid). Depending on size (mean of three perpendicular diameters) tumors were binned in four groups: < 2.5 cm 73.8 Gy, 2.5 – 4.5 cm 79.2 Gy, 4.5 – 6 cm 84,6 Gy, > 6 cm 90 Gy. Patients were treated in 3D target splitting technique. In order to estimate the normal tissue complication probability (NTCP) two Lyman models and the cutoff-logistic regression model were fitted to the data. AE ≥ grade 2 was the statistical endpoint. Toxicity was documented prospectively according to RTOG.

Results: With a median follow up of 686 days (range 84 – 2921 days), the actuarial local control rates were 72.6% and 59.4% at 2 and 3 years, regional control was 91%. The median overall survival was 25 months. 23/66 patients (35%) experienced AE ≥ grade 2. The Lyman-MED model (D50 = 32.8 Gy, m = 0.48, n = 1) and the cutoff dose model (V_{Dc} = 38 Gy) provide the most efficient fit to the current dataset. On multivariate analysis V38 was the most significant predictor of AE ≥ grade 2 (HR = 1.05, CI 1.01 – 1.09, p = 0.009).

Conclusions: The rate of AE ≥ grade 2 is slightly lower than with concomitant radio-chemotherapy, which is regarded as state-of-art treatment for locally advanced NSCLC. In the current patient cohort the most significant predictor of AE was found to be V38 (volume of the esophagus that receives 38 Gy, CI 28.2 – 57.3).